

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

)	
ECOLAB INC. and ECOLAB USA INC.,)	
)	
Plaintiffs,)	C.A. No. 21-cv-00567-RGA
)	
v.)	
)	
DUBOIS CHEMICALS, INC.,)	
)	
Defendant.)	
)	

DECLARATION OF JONATHAN ROTHSTEIN, PH.D.

I, Jonathan Rothstein, hereby declare as follows:

1. I am a professor at the University of Massachusetts and have been retained as an expert on behalf of Plaintiffs Ecolab Inc. and Ecolab USA Inc. (collectively “Ecolab”) in the above-captioned action.

2. I make this declaration supporting Plaintiffs' Opposition to Defendant's FRCP 12(c), Summary Judgment, and *Daubert* Motions.

3. I hold a Bachelor of Engineering degree in Mechanical Engineering from The Cooper Union, a Masters of Science in Engineering and Applied Sciences from Harvard University, and a Ph.D. in Mechanical Engineering from the Massachusetts Institute of Technology.

4. I am currently a Professor in the Department of Mechanical and Industrial Engineering and an Adjunct Professor in the Department of Chemical Engineering at the University of Massachusetts.

5. In my roles at the University of Massachusetts, I have taught courses such as Advanced Fluid Dynamics, and Viscous (and Viscoelastic) Fluids, among others. In Viscous

(and Viscoelastic) Fluids, I have taught graduate students lubrication theory and the principles of droplet formation and spray atomization.

6. I am currently the Vice President of the Society of Rheology and on the editorial board of the Journal of Non-Newtonian Fluid Dynamics. “Rheology” refers to the study of the deformation and flow of matter.

7. A more complete description of my education and expertise can be found in my opening expert report, dated January 31, 2023, and my curriculum vitae, which is attached as Exhibit A to that report.

8. I have reviewed a declaration submitted by DuBois’ expert, Jacques Rouillard, which I understand was submitted in support of DuBois’ FRCP 12(c), Summary Judgment, and *Daubert* Motions.

9. I have likewise reviewed the Court’s construction of “non-energized nozzle.” My understanding is that the Court construed the claim term “non-energized nozzles” in this case to mean “a nozzle that does not require pressure greater than 80 psi, compressed air, or sonication.”

10. In his declaration, Mr. Rouillard asserts that a spray bottle is an example of an energized nozzle because, according to Mr. Rouillard, the spray bottle uses compressed air to prime the spray bottle for use. I disagree with this conclusion for a number of reasons.

11. Mr. Rouillard is misunderstanding or misrepresenting the relevant physics principles at issue.

12. Mr. Rouillard is confusing and, as a result, conflating the pressure required to keep the entire system under pressure and move fluid from one point in the system (e.g., the bottle) to the nozzle head with whether energy, such as high pressure, compressed air, or sonication, is required at the nozzle.

13. Systems with both energized and non-energized nozzles require some amount of mechanical energy input to function properly. This is because in order to move lubricant from the reservoir, through the tubing and to the nozzle, the pressure exerted on the lubricant upstream of the nozzle must be much larger than the atmospheric pressure outside the nozzle exit. If that isn't the case, the lubricant will not flow through the system.

14. Pressurizing the system can be done in a number of ways including using a mechanical pump to pressurize or displace the liquid in the tubing or a compressor to pressurize air and liquid in the reservoir. In a spray bottle, the system is pressurized by pulling back the trigger on the spray head by squeezing it. This causes the pressure in the air space of the bottle to increase and exert pressure downward on the liquid in the bottle. The increased downward pressures force the liquid up the diptube and out the nozzle head. The pressure causes the fluid to move and occurs inside of the bottle, not at the nozzle head. This is similar to the pressure exerted on the lubricant in the reservoir in a lubricant dispensing system that causes the lubricant to flow throughout the system.

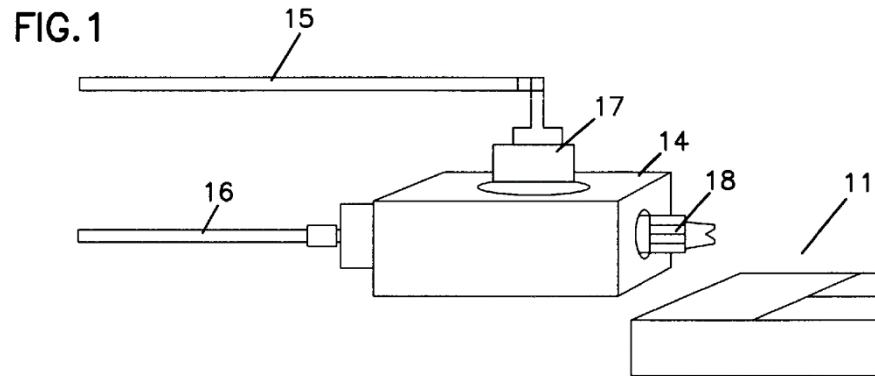
15. But Ecolab's patents and the Court's claim construction of non-energized nozzle both reference energy being applied at the nozzle, not in the overall system. For example, the '215 patent at column 1, lines 50-55 states that "[e]nergized nozzles refer to nozzles where the lubricant stream is broken into a spray of fine droplets by the use of energy, which may include high pressure, compressed air, or sonication to deliver the lubricant." The '381 patent at column 10, lines 36-59 describes the overall lubricant system as having a pressure below 80 psi. This section also describes energized nozzles as "nozzles where the lubricant stream is broken into a spray of fine droplets by the use of energy, which may include high pressures, compressed air, or sonication to deliver the lubricant."

16. Spray bottles, like those used to spray DuBois lubricants, do not produce high pressures within the bottles and are typically rated to no more than 40 psi. Based solely on the pressures attained, it is my opinion that hand spray bottles cannot be considered “energized nozzles” as that term is used in the patents and the Court’s claim construction.

17. Additionally, the pressure in a spray bottle is used inside of the bottle to move liquid through the system, not *at the nozzle* to assist in atomizing the liquid stream, as described in the patents in suit. Nozzles that use compressed air to assist atomization of liquid are called air atomizing or air assisted spray nozzles. In these nozzles, air and liquid co-flow and mix within the nozzle. The air typically travels through the nozzle at much higher speeds than the liquid, resulting in a shearing and mixing of the liquid that improves atomization especially for high viscosity liquids like the silicone lubricants in use before Ecolab invented the current lubricant technology.

18. An example of a system requiring compressed air at the nozzle can be found in Ecolab’s patent U.S. 6,576,298. Figure 1 of this patent shows lubricant supply line 15 and air supply line 16 co-flowing into the manifold 14 with nozzle 18. The ’298 patent explains at column 22, lines 42-50 that “[w]ithin the manifold, the lubricant flow is directed into the air flow. At the interface, between the air flow and the lubricant flow, the shear on the lubricant liquid caused by the incidents of the air stream causes the relatively large low or stream of

lubricant to be broken into particles of the appropriate size and distribution in the air flow.” The use of the air stream at the nozzle head in the ’298 patent is an example of an energized nozzle.



19. Unlike the air assisted nozzles shown in the figure above, the nozzles in hand spray bottles do not use compressed air to assist in the atomization of the lubricant. It is my opinion that the nozzles used in a hand spray bottles are therefore non-energized nozzles as that term has been construed in this case and that their use to spray lubricant onto conveyor surfaces infringes Ecolab’s patents for the reasons set forth in my opening and reply reports.

20. It is my opinion that DuBois has directly and indirectly infringed claim 41 of the ’257 patent in connection with its Dry Trac products, Super Loob OF, and Smart Track (collectively the “DuBois Dry Lubricants”) for the reasons stated in my Opening Expert Report, a true and correct copy of which is attached as Exhibit 1 to this declaration, and I would so testify at trial regarding the same.

21. Exhibit D to my Opening Expert Report is a Claim Chart for U.S. Patent No. 7,741,257 demonstrating DuBois’ infringement. It is incorporated by reference into this Declaration, and I intend to testify according to its contents at trial.

22. It is also my opinion that DuBois has directly and indirectly infringed claims 1-14, 16, and 17 of the '381 patent in connection with the DuBois Dry Lubricants for the reasons stated in my Opening Expert Report, and I would so testify at trial regarding the same.

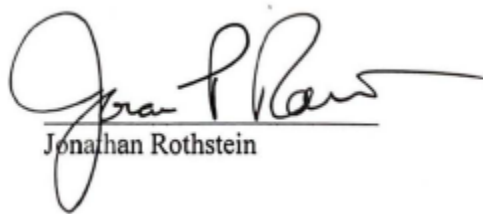
23. Exhibit E to my Opening Expert Report is a Claim Chart for U.S. Patent No. 7,745,381 demonstrating DuBois' infringement. It is incorporated by reference into this Declaration, and I intend to testify according to its contents at trial.

24. It is my opinion that DuBois has directly and indirectly infringed claims 1-2, 4-16, 19, and 21-22 of the '215 patent in connection with the DuBois Dry Lubricants for the reasons stated in my Opening Expert Report, and I would so testify at trial regarding the same.

25. Exhibit F to my Opening Expert Report is a Claim Chart for U.S. Patent No. 8,058,215 demonstrating DuBois' infringement. It is incorporated by reference into this Declaration, and I intend to testify according to its contents at trial.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 22nd day of June, 2023.



Jonathan Rothstein